



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/805,309	03/22/2004	Junichiro Kobayashi	SON-2977	9147

23353 7590 07/19/2006

RADER FISHMAN & GRAUER PLLC
LION BUILDING
1233 20TH STREET N.W., SUITE 501
WASHINGTON, DC 20036

EXAMINER

LE, THAO X

ART UNIT PAPER NUMBER

2814

DATE MAILED: 07/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

22

Office Action Summary	Application No. 10/805,309	Applicant(s) KOBAYASHI, JUNICHIRO	
	Examiner Thao X. Le	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,6 and 13-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,6 and 13-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 2, 4-5, 7-12, and 16-17 are canceled in the amendment file on June 02, 2006.

Claim Objections

2. Claim 3 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Recited "the area under said conductive layer between said semiconductor mesa portion and said base contact pad mesa portion forms a space" of claim 3 has broaden or contradicted the limitation "an insulating film is formed below said conductive layer between said semiconductor mesa portion and said base contact pad mesa portion" of claim 1. For the purpose of examination, assuming there is no space.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Applicant Admitted Prior Art (APA) in view of FR 2726125 to Delage et al. and US 6680791 to Demir et al.

Regarding claims 1, 3, APA discloses a semiconductor device in fig. 1b comprising: a semiconductor mesa portion 101-104 formed on a substrate 100 including a stack of at least a sub-collector layer 101, a collector layer 102, a base layer 103, and an emitter layer 104 formed in narrower region compared with said base layer 103, fig. 1b, and functioning as an active region of a bipolar transistor; an emitter cap layer (not shown), spec. page 2 line 3, and said emitter layer 104 forming an emitter mesa portion EM, fig. 1B, the base layer 103 and the collector layer 102 forming a base mesa portion BM, fig. 1b, the sub-collector layer 101 formed with a sub-collector mesa portion SM, fig. 1b, for isolation elements, and said collector layer 102 is formed connected with the sub-collector layer 101; a base contact pad mesa portion PSM (101a/102a/103a), fig. 1b, formed on said substrate 100 apart from said semiconductor mesa portion 101-104 and formed with a height the same as the height of the top surface of said base layer 103, fig. 1b; and including a layer 102a formed by the same layer as the collector layer 102, a layer 103a formed by the same layer as the base layer 103, and layer 101a formed by the same layer as the sub-collector layer 101; and a conductive layer 106 formed integrally with a base electrode 106a formed connected to said base layer 103 at part of a region of formation of said base layer 103 other than the region of formation of said emitter layer 104, fig. 1b, a base contact pad electrode 106b formed above said base contact pad mesa portion, and an interconnect 106c for connecting said base

electrode 106a and said base contact pad electrode 106b, and an insulating film 108 formed over said heterojunction bipolar transistor HBT, fig. 1B.

But APA does not disclose the semiconductor device wherein a base contact pad electrode formed above said base contact pad mesa portion in a region other than near the edges of the top surface of said base contact pad mesa portion, and wherein an insulating film is formed below said conductive layer between said semiconductor mesa portion and said base contact pad mesa portion.

However, Delage discloses a HBT comprises a base contact pad electrode (right portion of Pont-a-air in contact with Ra) formed above a base contact pad mesa portion in a region other than near the edges of the top surface of said base contact pad mesa portion, fig. 5b, and an interconnect (middle portion of Pont-a-air) for connecting said base electrode and said base contact pad electrode, wherein said base electrode is formed in a region other than the region of formation of said emitter layer and other than near edges of said base layer, fig. 5b. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the interconnect teaching of Delage with APA's device, because it would have created a thermally stabilized bipolar transistor as taught by Delage. In addition, the Applicant has no support data, which convinces that the particular claimed configuration is significant or is anything more than one of numerous configurations a person of ordinary skill in the art would find obvious for the purpose of providing mating surfaces. In re

Dailey 149 USPQ 47, 50 (CCPA 1966). See also Glue Co. v. Upton 97 US 3,24 (USSC 1878).

With respect to “an insulating film is formed below said conductive layer between said semiconductor mesa portion and said base contact pad mesa portion”, Demir discloses the semiconductor device in fig. 5 wherein an insulating film 332, col. 14 line 26, comprising low dielectric material or even air, col. 14 line 44, is formed below said conductive layer 330, col. 14 line 25, between said semiconductor mesa portion 316 and said base contact pad mesa portion 322, fig. 5. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the insulating layer 332 teaching of Demir with APA's device, because it would have ensured a low capacitance of the bridge connection as taught by Demir in col. 14 lines 40-45. Furthermore, at the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use the dielectric material teaching of Demir to fill the air gap structure of APA, because such material substitution would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over by Applicant Admitted Prior Art (APA), FR 2726125 to Delage et al. and US 6680791 to Demir et al. as applied to claim 1 above and further in view of US 6605825 to Brar et al.

Regarding claim 6, APA does not disclose a semiconductor where a distance between said semiconductor mesa portion and said base contact pad mesa portion is 1 to 5 micron.

However, Brar discloses a HBT in fig. 8 wherein a distance between said semiconductor mesa portion 12/14/16 and said base contact pad mesa portion (where 28 is located) is not greater than 1 micron (the width of the emitter contact 52 and air bridge 34), col. 4 line 36, to reduce the area of the HBT while preventing damage to the interconnect. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the width teaching of Brar with APA's device, because it would have limited the overall base-collector capacitance as taught by Brar in col. 5 lines 27-30.

6. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over by FR 2726125 to Delage et al. in view of US 6605825 to Brar et al. and US 5471078 to Bayraktaroglu.

Regarding claim 13, Delage discloses a semiconductor device in fig. 5b comprising: a semiconductor mesa portion (where emitter E is located) formed on a substrate including a stack of at least a collector layer (right above sous-collecteur), fig. 5b, a base layer (below layer cb), and an emitter layer E formed in narrower region compared with said base layer, fig. 5b, and functioning as an active region of a bipolar transistor; a base contact pad mesa portion R_B formed on said substrate apart from said semiconductor mesa portion (where E is located), fig. 1B, and formed with a height the same as the height of the top surface of said base layer, fig. 5b; and a conductive layer (Pont-a-air), fig. 5b, formed integrally with a base electrode (left portion of Pont-a-air in contact with base) formed connected to said base layer at part of a region of formation of said base layer other than the region of formation of said emitter layer E, fig. 5b, a

base contact pad electrode (right portion of Pont-a-air in contact with R_B) formed above said base contact pad mesa portion in a region other than near the edges of the top surface of said base contact pad mesa portion, fig. 5b, and an interconnect (middle portion of Pont-a-air) for connecting said base electrode and said base contact pad electrode, wherein said base electrode is formed in a region other than the region of formation of said emitter layer and other than near edges of said base layer, fig. 5b.

But Delage does not disclose the semiconductor device wherein a distance between said semiconductor mesa portion and said base contact pad mesa portion is 1 to 5 micron to reduce the area of the HBT while preventing damage to the interconnect having a thickness of about 0.2 to 0.5 micron.

However, Brar discloses a HBT in fig. 8 wherein a distance between said semiconductor mesa portion 12/14/16 and said base contact pad mesa portion (where 28 is located) is not greater than 1 micron (the width of the emitter contact 52 and air bridge 34), col. 4 line 36, to reduce the area of the HBT while preventing damage to the interconnect. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the width teaching of Brar with Delage's device, because it would have limited the overall base-collector capacitance as taught by Brar in col. 5 lines 27-30.

With respect to 'reduce the area of the HBT while preventing damage to the interconnect'. The structure recited in Brar is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent. Or where the claimed and prior art products are identical or substantially identical in

structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

With respect to the thickness of the interconnect 0.2 to 0.5 micron, Bayraktaroglu discloses the base contact 118 having a thickness of about 0.2 micron, col. 3 line 19. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the thickness teaching of Bayraktaroglu with Delage's device, because it would have reduce the emitter-base capacitance as taught by Bayraktaroglu in col. 3 lines 22-24.

Regarding claim 14, Delage discloses a semiconductor device wherein the surface layer of said base contact pad mesa portion is formed by the same layer as said base layer, fig. 5b.

Regarding claim 15, Delage discloses a semiconductor device as set forth in claim 13, wherein the area under said conductive layer between said semiconductor mesa portion and said base contact pad mesa portion forms a space, fig. 5b.

Response to Arguments

7. Applicant's arguments with respect to claims 1, 3, 6, and 13-15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

Art Unit: 2814

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, consisting of a stylized 'T' followed by a horizontal line and a vertical line intersecting it.

Thao X. Le
11 July 2006